



**PRAGMATIC DIVESTMENT OF KC-135 NAVIGATORS IN THE  
SPECIAL OPERATIONS AIR REFUELING MISSION**

THESIS

Andrew P. Nation, Captain, USAF

AFIT-ENV-MS-15-M-255

**DEPARTMENT OF THE AIR FORCE  
AIR UNIVERSITY**

**AIR FORCE INSTITUTE OF TECHNOLOGY**

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**Wright-Patterson Air Force Base, Ohio**

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THESIS

Presented to the Faculty

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Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the  
Degree of Master of Science in Systems Engineering

Andrew P. Nation, BS

Captain, USAF

March 2015

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### **Abstract**

In the late 1990s, the Air Force eliminated over 200 KC-135 navigators, leaving 50 remaining for the aircraft's most complex Special Operations Air Refueling (SOAR) mission. As the Air Force unveils the KC-46 Pegasus, this mission will continue but without a position for the navigator. Instead, navigators will undergo divestment as the SOAR mission transfers to the KC-46. Current plans indicate navigators will not only remain as the KC-46 arrives, but inbound navigators will continue arriving until 2018. This thesis applies the Delphi method, a process eliciting analysis anonymously from a panel of experts, in order to examine the elements affecting KC-135 navigator divestment and offer a more effective, comprehensive solution. Ultimately, the panel of experts arrived at conclusions supporting the hypothesis that navigator divestment and SOAR transition should occur sooner, rather than later, in order to secure a future for current navigators, ensure responsible development of Air Force officers, and enable the complex SOAR mission to endure. In order to best achieve these results, the experts recommended halting all inbound navigator assignments, reassigning navigators at a conservative rate over the next several years, and beginning a SOAR transition program to replace the tanker navigator with a third pilot concept.

## **Acknowledgments**

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Andrew P. Nation

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# **PRAGMATIC DIVESTMENT OF KC-135 NAVIGATORS IN THE SPECIAL OPERATIONS AIR REFUELING MISSION**

## **I. Introduction**

### **Background**

Over the past half century, the United States Air Force made significant progress in the advancement of warfighting capabilities for its aircraft fleet. Perhaps the most substantial innovation was the development of the Global Positioning System (GPS). The application of the GPS to triangulate aircraft position increased navigation precision and, over time, contributed to a decreased need for the navigator crew position on many aircraft. In fact, this decreased navigator need, teamed with an increasingly antiquated training program, prevented many navigators from reaching their full career potential. Therefore, in 2004 the Air Force transformed the navigator role into the Combat Systems Officer (CSO) and created a modernized training program which enabled more crew integration and the ability to operate complex systems (Chapman 2005).

Navigators on the KC-135 Stratotanker realize the effects of avionics advancement and the decreased need for their Major Weapons System (MWS) role all too well. Between 1997 and 2001, the KC-135 was outfitted with a sophisticated upgrade called “Pacer CRAG,” where CRAG stood for compass, radar, and GPS (Clarke 1999). This enhancement eliminated positions for navigators on all but the most complex missions, and 203 of the originally funded 254 aviators were removed between 1996 and 2000 (Deivert 1994). The disheartening aspect of this reduction involved an assignment

system which could not handle reallocation of over 200 navigators in such a short time. Consequently, most of these officers were eliminated from the Air Force entirely.

The navigators which remained on the KC-135 after the completion of the transition to primarily three-person crews in 2001 were specifically retained to fly Special Operations Air Refueling (SOAR) missions. These missions were considered the most complicated and demanding on the crew, necessitating the fourth crew member. However, even at the end of the Pacer CRAG upgrade, the need for a navigator on these SOAR missions was scrutinized. According to Major Robert Deivert, a global mobility expert, this additional manpower could be another pilot, boom operator, or even a flight engineer (1994).

Today, the Air Force is again revisiting the question of what to do with KC-135 navigators. The replacement to the Stratotanker, the KC-46 Pegasus, is scheduled for delivery in 2017 and is not retrofitted with a navigator suite (2013, Aviation). This thesis will discuss some feasibility studies with respect to the Air Force Specialty Code (AFSC) options to replace the navigator. However, Air Force leadership currently proposes a third pilot construct to perform the role and fulfill SOAR duties on the new aircraft. Additionally, present plans involve delaying the divestment of KC-135 navigators and transition of the SOAR mission until KC-46 delivery.

## **Problem Statement**

According to Colonel Michael Bauer, Chief of Air Mobility Command's Combat Operations Division, current SOAR transition plans necessitate inflow of CSOs from Specialized Undergraduate Navigator Training (SUNT) according to Table 1 below.

**Table 1. Inbound Navigator Manning Pipeline**

<b>Fiscal Year</b>	2014	2015	2016	2017	2018
<b>Number of Inbound Navigators</b>	10	10	10	5	0

This plan was designed to parallel the transition of the KC-135 to the KC-46, a beddown with a Primary Aircraft Inventory (PAI) and Backup Aircraft Inventory (BAI) schedule depicted in Table 2 below (AMC PPLAN 14-01 2014).

**Table 2. McConnell AFB KC-135 Drawdown/KC-46A Beddown Schedule PAI/BAI**

<b>Type</b>	<b><u>FQ1/16</u></b>	<b><u>FQ2/16</u></b>	<b><u>FQ3/16</u></b>	<b><u>FQ4/16</u></b>	<b><u>FQ1/17</u></b>	<b><u>FQ2/17</u></b>	<b><u>FQ3/17</u></b>	<b><u>FQ4/17</u></b>
KC-135	44/11	40/11	36/11	36/7	36/7	32/5	28/3	24/3
KC-46	0	3/0	5/0	7/0	10/0	14/0	18/0	21/0
<b>Type</b>	<b><u>FQ1/18</u></b>	<b><u>FQ2/18</u></b>	<b><u>FQ3/18</u></b>	<b><u>FQ4/18</u></b>	<b><u>FQ1/19</u></b>	<b><u>FQ2/19</u></b>	<b><u>FQ3/19</u></b>	<b><u>FQ4/19</u></b>
KC-135	24/3	24/3	18/4	12/5	12/5	12/2	12/2	12/2
KC-46	24/0	24/0	24/0	24/0	28/0	32/0	36/0	36/1

While this proposal is achievable, it generates an unnecessary amount of risk by assuming KC-46 aircraft will not encounter problems absorbing the SOAR mission. According to AMC PPLAN 14-01, Initial Operational Test and Evaluation (IOT&E) will not commence until the third fiscal quarter of 2016 (2014). This permits only a short window to determine and correct any incompatibilities between the KC-46's communications suite and required SOAR Command and Control (C2) equipment. Additionally, these schedules pose manpower and career development concerns by sending young navigators into terminating jobs at a time when they most need to develop

airmanship skills. Lastly, since inbound navigators are scheduled through 2017 and KC-46 beddown is scheduled to complete in 2019, the proposed timeline suggests the Air Force Personnel Command's (AFPC) assignment system will again find itself flooded with a large number of KC-135 navigators in a short period of time. Based on the Air Force's decision to eliminate over 200 navigators in the late 1990s, history suggests the assignment system cannot handle such a demand efficiently.

### **Research Questions**

The purpose of this thesis is to answer the question, "What is the best manner in which to handle the divestment of KC-135 navigators and the transition of the SOAR mission?" In order to refine AMC's current transition plan, it is necessary to examine the problem from several vantage points using a systems approach and examine multiple courses of action to effectively and efficiently remove navigators from the KC-135 SOAR mission while minimizing costs. The resulting recommendation must deliver a cradle to grave Manpower, Personnel, and Training (MPT) blueprint for the elimination of KC-135 navigators, as well as a training program for an additional SOAR crew member. In light of the Department of Defense's (DoD) shrinking budget, these plans must underscore cost savings in the Air Force's best interests.

### **Investigative Questions**

In order to meet these research objectives, several questions must be explored. These investigative questions consider SOAR transition ramifications from many angles, including Air Force Instruction (AFI) revisions, personnel and training costs, Unit

Manning Document (UMD) updates, navigator career implications, who should absorb the navigator's existing duties, and how training should be handled. Table 3 lists the questions which must be researched in order to present a comprehensive navigator divestment and SOAR transition plan.

**Table 3. Investigative Questions**

#	Question
1	How should navigators be divested from the KC-135?
2	What are potential manpower, personnel, and training effects after navigators are phased out?
3	What is the most feasible replacement for navigators in the SOAR mission? What are the cost implications?
4	What changes are required to Air Force regulations to transition the SOAR mission?
5	How will the Unit Manning Document (UMD) need to be restructured to support the new SOAR construct?
6	How will navigator replacements be trained and SOAR certified?
7	How will the assignment system handle KC-135 navigators from various year groups? Where will they go? How will they accrue gate months?

### **Methodology Overview**

In order to obtain sufficient information to address the aforementioned investigative questions, the Delphi Process will be employed. Much of the research identifying AMC's current transition plan relies on interviewing key staff personnel to obtain information. Based on a series of sequential questionnaires delivered to these experts independently, the Delphi methodology will elicit information and expert opinions to draw group conclusions without the burden of group think. The Delphi technique "eliminates committee activity altogether, thus further reducing the influence of certain psychological factors, such as specious persuasion, the unwillingness to abandon publicly expressed opinions, and the bandwagon effect of majority opinion. This technique replaces direct debate by a carefully designed program of sequential



individual interrogations (best conducted with questionnaires) interspersed with information and opinion feedback derived by computed consensus from the earlier parts of the program” (Brown 1968). Additionally, anonymity of experts in this research is vital to obtain objective analysis without bias due to military rank, position, experience level, or reputation. Due to the nature of this research and forecasting involved, the Delphi Process is the best method to elicit valuable insight and arrive at a conclusion.

### **Hypothesis**

The results of this research may suggest halting the inbound pipeline of navigators to the KC-135, expediting conversion of the SOAR mission to a certified third pilot operator construct, and reassigning navigators through normal attrition. The elimination of navigators may require manpower reorganization involving decreasing the number of KC-135 squadrons qualified in the SOAR mission from four to three. While it is not expected to encounter problems training navigator replacements and changing applicable regulations and AFIs, the most challenging aspect of the anticipated outcome will most likely involve where to send current KC-135 navigators in order to satisfy normal career progression, meet aviation service requirements, and maximize utility given the Air Force’s significant training investments. Lastly, since it is expected the vast majority of the SOAR mission will be absorbed internally with minimal training, personnel, and flying costs, there will be a significant cost savings from eliminating navigators sooner, rather than according to AMC’s proposed timeline.

## **Assumptions/Limitations**

AMC's transition plan for the SOAR mission is closely tied to the transition of the KC-135 to the beddown of its replacement, the KC-46. While there are significant matters to investigate regarding SOAR capabilities on the KC-46, this thesis is scoped to examine SOAR transition and navigator divestment independent of KC-46 changeover. The only way this research relates to the KC-46 is to illustrate the potential risk mitigation of shifting the SOAR mission to a non-navigator operator prior to KC-46 delivery, rather than at the same time.

Other limitations on this research involve restricted access to classified SOAR documents and limited access to privileged information outside of the author's leadership chain. Such information includes, but is not limited to, detailed manpower projections and force reduction data from AFPC, assignment system impacts of Air Staff strategic decisions like potential U-28 and MC-130P phase-outs, and already programmed budgetary decisions including annual funding for SUNT trainees. While arguments are based on the best available and accessible data, it is possible other factors exist which inform AMC Staff plans and decisions.

## **Expected Contributions**

The conclusions of this thesis are intended to shape the body of knowledge relating to force management of aircrew personnel in the Air Force. History reveals the Air Force has struggled with large-scale manpower decisions, typically spending significant amounts of money both reducing and increasing the size of the force. Too often, the increases have been too aggressive and the reductions too severe (Kitfield

2012). The waves created by these actions cause significant problems for aircrew and are extremely inefficient, especially considering the substantial training investment for pilots and navigators.

From a training standpoint, the Air Force will always require a certain number of instructors to train the inbound student pipeline. When that instructor corps is cut, the void is filled by younger, less experienced aircrew. Therefore, more risk is accepted, and the force is eventually hollowed. Aside from these training implications, however, it is also important to consider the inefficiency of cutting fully trained and developed aviators and replacing them with new trainees. The results of this thesis are intended to address these possible inefficiencies by determining whether waste exists in the KC-135's proposed SOAR transition plan and if so, to suggest an alternative approach which more robustly and resourcefully meets the Air Force's needs.

### **Preview of Thesis**

This thesis begins by investigating current manpower, personnel, and training research, the future of the Air Force CSO, and historical KC-135 manning reductions in the Chapter II Literature Review. This review will lay out background information and a framework which informs research analysis. After exploring the current body of knowledge relating to the thesis topic, Chapter III will discuss how the overall research question and investigative questions will be answered, including who will replace KC-135 navigators, how they will be replaced, and where they will go. Using those Chapter III methodologies, the research questions will be thoroughly evaluated in Chapter IV's analysis and results. Finally, after carefully piecing together the thesis results, Chapter V

will offer the author's comprehensive plan for the divestment of KC-135 navigators and transition of the SOAR mission. This conclusion will judiciously assess AMC's current proposals and assert the author's findings for the best way forward in the interests of the Air Force.

## **II. Literature Review**

### **Chapter Overview**

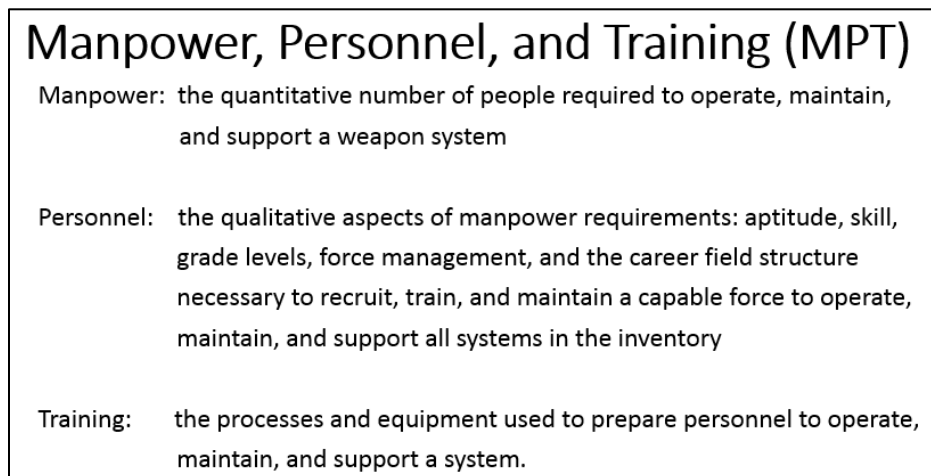
The purpose of this chapter is to explore the current body of knowledge in academic literature related to the divestment of aircrew from a MWS. Since this thesis is comprehensively scoped to examine manpower divestment, skillset transition, and officer development, the literary review also encompasses a broad spectrum of topics. Included in this chapter are data points and key findings on life cycle costs which impact manpower decisions, risks incurred during rated aircrew divestment and skillset reallocation, and future development opportunities for Air Force navigators.

### **Manpower, Personnel, and Training Life Cycle Costs**

The most important factors impacting how and when to transition personnel enduring human capital divestment are cost and mission effectiveness. While the Air Force historically invests substantial sums of money to ensure units are always effective in accomplishing the mission, the question during times of austerity and while balancing priorities with scarce resources becomes “What is the acceptable level of effectiveness, and at what cost?” While KC-135 navigators were specially trained for the unique SOAR mission, the discussion at hand is whether the chosen navigator replacements conducting this duty will be as effective and at what fiscal and opportunity costs to delaying navigator divestment. The Delphi method will explore expert analysis regarding effectiveness of navigators and their proposed third pilot replacements. However,

previous studies and research exist which explain life cycle costs due to manpower, personnel, and training.

According to Philbert Cole, Jr., Senior Acquisition Advisor at DynCorp International, “Life cycle cost is the most important determinant of new aeronautical systems acquisitions. Operating and support (O&S) costs are 40% to 60% of life cycle cost. Manpower, personnel, and training average 65% to 75% of O&S costs” (1991). Many think of life cycle costs as all of the infrastructure and resources required to support the life of a weapon system but fail to realize the weapon system, in this case a KC-135, is not just the aircraft. Integral to this system and its associated life cycle cost are its operators whose manning and training are dependent upon numerous additional support agencies like aircrew flight equipment, training, scheduling, and readiness personnel. Therefore, Cole states the MPT portion of O&S life cycle cost is the largest and most complex (1991). The elements of MPT are defined in Figure 1 below (Cole 1991).



**Figure 1. MPT Defined**

As Cole indicated, the computation of MPT is complicated. Fortunately, the costs incurred to train brand new navigators and pilots are available. **Error! Reference source not found.** details these variable and fixed MPT costs according to Mr. Mark Parsons from Headquarters Air Education and Training Command's office of Financial Management (2014, AETC). It is important to note that navigator initial qualification training is conducted "in-house" at McConnell Air Force Base, and is therefore not included in the AETC computation. At first glance, the cost of Specialized Undergraduate Pilot Training (SUPT) per pilot is about double the cost of primary Combat Systems Officer (CSO) training, formerly known as Specialized Undergraduate Navigator Training (SUNT). Strictly in terms of cost, it appears prudent to retain navigators for as long as possible if required to replace them on a one-for-one basis.

**Table 4. Initial Aircrew Training Costs Per Graduate**

<b>REPRESENTATIVE OFFICER AIRCREW TRAINING COSTS (VARIABLE AND FIXED MPT COSTS PER GRADUATE)</b>				
		<b>FY'12</b>	<b>FY'13</b>	<b>FY'14</b>
<b>SUPT - TANKER (T-6 + T-1A)</b>	Variable	\$307,223	\$311,923	\$317,085
	Fixed	\$415,435	\$430,229	\$432,269
	<b>Cost</b>	<b>\$722,658</b>	<b>\$742,152</b>	<b>\$749,354</b>
<b>PRIMARY CSO*</b>	Variable	\$175,923	\$178,615	\$181,570
	Fixed	\$201,422	\$207,451	\$208,801
	<b>Cost</b>	<b>\$377,345</b>	<b>\$386,066</b>	<b>\$390,371</b>
<b>KC-135 PIQ</b>	Variable	\$166,682	\$169,232	\$172,032
	Fixed	\$240,730	\$252,484	\$252,338
	<b>Cost</b>	<b>\$407,412</b>	<b>\$421,716</b>	<b>\$424,370</b>
<b>Notes:</b> The SUPT numbers are cumulative in nature. *Primary Combat System Operator moved to NAS Pensacola. Does not include Navy support				

Clearly the cost to train and equip a pilot is greater than for a navigator. However, it is important to also investigate how the number of aircrew required is determined in the first place and whether transitioning the SOAR mission from navigators to pilots necessitates the same number of pilot replacements. These planning factors are driven by information reported in the Status of Resources and Training System.

### **Status of Resources and Training System (SORTS)**

AFI 10-201 requires measured units to report their readiness in terms of resources and training. According to Major Paul Orth, “SORTS indicates a unit’s ability to undertake its full wartime mission as defined in the Designed Operational Capability (DOC) Statement” (2008). This DOC Statement is the source document which drives a unit’s resource and training requirements and is either associated with Unit Type Codes (UTCs) or a Unit Manning Document (UMD) to define manpower needs. On a monthly basis, a unit assesses its ability to meet the capabilities outlined in the DOC Statement and reports an overall category level to the Chairman of the Joint Chiefs of Staff using the following definitions outlined in Figure 2 (AFI 10-201 2013). [Appendix A](#) illustrates an example DOC Statement.



## SORTS C-Levels

1.9.1. C-1. The unit possesses the required resources and is trained to undertake the *full mission(s)* for which it is organized or designed. The resource and training area status will neither limit flexibility and methods for mission accomplishment nor increase vulnerability of unit personnel and equipment. The unit does not require any compensation for any deficiencies.

1.9.2. C-2. The unit possesses the required resources and is trained to undertake *most of the mission(s)* for which it is organized or designed. The resource and training area status may cause isolated decreases in flexibility in methods for mission accomplishment, but will not increase the unit's vulnerability under most envisioned operational scenarios. The unit would require little, if any, compensation for deficiencies.

1.9.3. C-3. The unit possesses the required resources and is trained to undertake many, but not all, portions of the mission(s) for which it is organized or designed. The resource and training area status will result in significant decrease in flexibility for mission accomplishment and will increase vulnerability of the unit under many, but not all, envisioned operational scenarios. The unit would require significant compensation for deficiencies.

1.9.4. C-4. The unit requires additional resources or training to undertake its mission(s), but it may be directed to undertake portions of its mission(s) with resources O/H.

1.9.5. C-5. The unit is undergoing a Service-directed resource action and is not prepared, at this time, to undertake the mission set for which it is organized or designed. Within the CBDRT, units will use C-5 to indicate when they have no Chemical, Biological, Radiological, Nuclear, and High-Yield Explosive (CBRNE) defense equipment or training requirements.

**Figure 2. SORTS Category Levels**

Ideally, a measured unit reports C-1, indicating it is capable of conducting all of its tasked missions. However, in times of austerity this is often difficult to achieve. It is even more difficult to maintain this capability during turbulent resource transitions and acquisition beddown, which sometimes necessitates a C-5 assessment. While the overall C-Level is relevant to the SOAR transition discussion, examining the structure of the DOC Statement is more informative to illustrate the number of navigators, or their replacements, required to accomplish the mission.

A DOC Statement for a flying Wing is very specific in terms of personnel, equipment, and training requirements, as well as normal and surge requirements for aircraft generation. In order to determine how many aircrew positions are required to accomplish the mission, two pieces of information are required: the number of permanently assigned aircraft (PAA) and the crew ratio. Since a unit must account for administrative requirements like temporary duties, leave, and sickness, the Major Command determines an appropriate “crew ratio” for aircrew manning (Cole 1991). This crew ratio is multiplied by the PAA and the crew complement to determine required manning levels for each aircrew position.

In the DOC Statement for the 22d Air Refueling Wing (22 ARW), the unit solely responsible for the KC-135 SOAR mission, SOAR crews are comprised of two pilots, one navigator, and 1.25 boom operators. More specifically, for every four SOAR crews assigned, the 22 ARW is authorized eight pilot, four navigator, and five boom operator manning billets. The 22 ARW also has nuclear and traditional air refueling missions which do not include a navigator in their crew complements. While the 22 ARW is manned to meet maximum tasking requirements for all three of its designated missions, it is extremely unlikely it would ever be tasked at maximum capacity for all three simultaneously. Therefore, due to the significant number of pilots assigned to the wing to accomplish all three of its missions, the required crew complement for pilots could effectively remain the same, rather than increase, when the navigator requirement is eliminated. In other words, flexibility allows for utilization of a pilot as a copilot one day and a “third pilot” the next, or even as a copilot for a portion of a flight and a “third pilot”

for another portion of the flight. The transition does not necessarily call for a one-for-one navigator replacement, but an analysis of manpower utilization is beneficial to determine the proper crew ratio.

### **Dynamic Manpower Reallocation**

Decisions involving how best to structure units, balance levels of effort, and maximize productivity often involve many variables, some measured objectively and others derived subjectively. Lieutenant Colonel Brent French, a mobilization expert, published an article titled “Decision Framework for Dynamic Manpower Reallocation” which defines a manner in which to assess utilization of manpower across units. He presents the decision framework as consisting of two dimensions: a utilization factor and a utility function (2007, French). He then describes these two dimensions:

The utilization factor is used to develop a burden index, useful in comparative analysis and answering the question, “Are some of my units working disproportionately longer hours than others?” The utility function then provides the commander the tools to decide, “Should I temporarily augment an overused unit with manpower from an underused unit?” (2007).

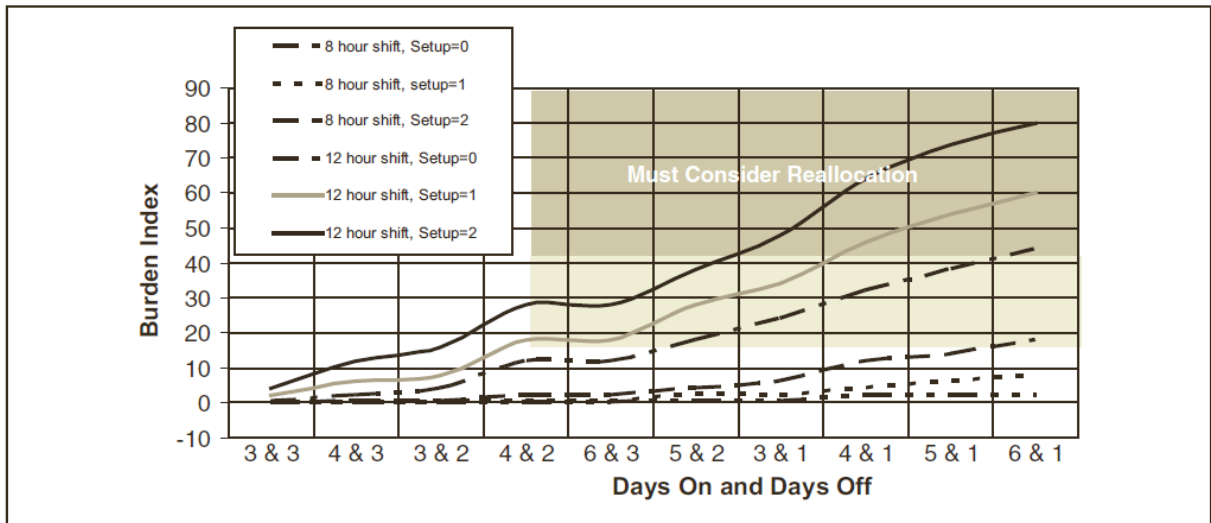
More specifically, the utilization rate is defined as the percentage level of effort, where 0% means manpower present for duty completely fail to provide any work output while 100% indicates the maximum possible man-hour output with manpower available. The utility factor, on the other hand, is defined as the mission impact of manpower reallocation. While the utilization factor and utility function are associated with units in this case, one can apply the framework to members within unit, as well, like pilots and

navigators. French suggests taking into consideration manpower available, the situation, and the schedule to determine utilization factor. Table 5 illustrates calculations of various utilization factors for several work schedules.

**Table 5. Output and Utilization Factors for Various Schedules (2007, French)**

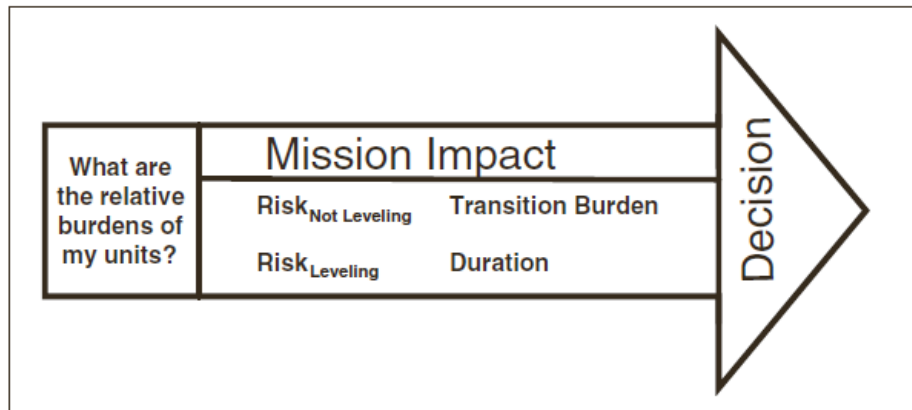
Unit Name	PFD	Situation	Schedule Definition(hrs)	Days On Days Off	Cycles per TP	Output Customer (hours)	Setup (hours)	Output Duty (hours)	Maximum (PFD * 7/0/12/2)	"Degree of Flexibility"	Utilization	Burden Index
BASELINE	100	Max	12	7 0	4.00	33,600	2	39,200	39,200	Inflexible	100%	100
	100	Contingency	12	6 1	4.00	28,800	2	33,600	39,200	Inflexible	86%	84
	100	Normal	8	5 2	4.00	16,000	1	18,000	39,200	Inflexible	46%	2
	25		12	5 2	4.00	6,000	0	6,000	9,800	Inflexible	61%	18
	25		8	5 2	4.00	4,000	0	4,000	9,800	Constrained	41%	0.375
	25		8	5 2	4.00	4,000	0	4,000	9,800	Flexible	41%	0.25
Sqn A	72		8	5 2	4.00	11,520	2.5	15,120	28,224	Constrained	54%	6
Sqn B	321		12	6 3	3.11	71,904	2	83,888	125,832	Inflexible	67%	28
Sqn C	268		12	1 1	14.00	45,024	4	60,032	105,056	Flexible	57%	6
Sqn D	111		10	6 1	4.00	26,640	4	37,296	43,512	Inflexible	86%	80
Sqn E												

The inputs determining utilization factor ultimately enable the calculation of a “burden index” to recommend which units or personnel should be considered for reallocation before determining the more subjective utility function (2007). Figure 3 plots these burden indices to suggest which personnel should be considered for manpower reallocation based on schedules in Table 5.



**Figure 3. Plot of Relative Burden Indices**

Ultimately the utility function, or mission impact, is the overarching factor driving the decision of whether or not to reallocation manpower. French keys in on three variables which affect mission impact in terms of dynamic manpower reallocation: risk of either leveling or not leveling manpower, transition burden, and duration. This decision framework is illustrated in Figure 4, where “leveling” means balancing manpower across units to yield equivalent workload (2007). While the risk of leveling relates to shortfalls and loss of utility due to reallocation of personnel away from a unit, the risk of not leveling accounts for the cost of not reallocating resources. Duration relates to how long the reallocation is necessary, and the transition burden “considers the level of training required, the periodicity of the training, the physical resources required to perform the task, and the re-transition burden when the temporary duty is complete (2007).



**Figure 4. Dynamic Manpower Reallocation Decision Framework**

One can apply the decision framework for dynamic manpower reallocation to the restructuring of pilots in place of KC-135 navigators. In terms of the SOAR transition, the risk of not leveling is the cost incurred by either not replacing navigators or by delaying the transition. The risk of leveling is the utilization lost by reallocating pilots away from traditional pilot duties when serving in the traditional SOAR navigator role. The duration in this case is indefinite, and the transition burden encompasses all of the training and resources required to develop a suitable SOAR navigator replacement.

### **Officer Development for Rated Air Force Navigators**

As previously stated, the decision framework for manpower reallocation involves the risk of not leveling as a critical decision variable; in other words, either not replacing or delaying the replacement of navigators. A large component of this risk involves officer development of navigators. Quite simply, the longer the Air Force waits to transition the KC-135 navigator career field, the more likely the transition period will be shortened. Since the Air Force’s assignment system relies on manning projections and

specific positions becoming available at a steady pace, issues often arise when the system is flooded in a short period of time, like when the Air Force eliminated over 200 navigators by the year 2000 because there were no suitable positions available (Deivert 1994). Thereafter, the Air Force is forced to either inefficiently eliminate rated officers, in whom it has invested large sums of money for training, development, and experience, or to stall careers due to lack of suitable assignments available. Arguably, the latter is just as inefficient since it causes many officers to resign their commissions. Rebecca Grant, president of IRIS Independent Research, stated, “Over the last 10 years, the transition to a much smaller fleet with diverse taskings has turned rated management into a roller coaster whose ups and downs affect the force for years to come” (2014).

Rated aircrew management, which includes pilots, navigators, and air battle managers, seeks to meet current operational needs while building future leaders (Grant 2014). In order to build those future leaders, the Air Force postures experienced aviators, defined as those who have attained over 500 flight hours, in management positions at the Wing level and above (Grant 2014). Some of these coveted positions include staff billets at major commands, combatant commands, the Joint Staff, the Pentagon, and at Air Force Headquarters (Grant 2014). Due to additional supervisory staff and safety duties, Grant estimates experienced aircrew should fill between 45% and 55% of a flying squadron’s manning billets (2014).

Over 10 years ago, Air Force senior leadership identified that for some time navigators were prevented from reaching their full career potential, and the lack of navigators in the general officer ranks suggested their training programs were antiquated

(Chapman 2005). In other words, over time this out-of-date training led to devaluing of the navigator crew position and decreased leadership development opportunities.

According to General Donald G. Cook, former Commander of Air Education and Training Command, “We have for too long in our Air Force undervalued the potential and the capability and the abilities of our navigators” (2005). Since current Air Force navigators, or Combat Systems Officers, now experience a modernized training program, it will be interesting to see if the trend senior leaders recognized 10 years ago continues, and management of the KC-135 navigator transition will serve as a clear indicator.

The dilemma of career progression for Air Force navigators is not new. In fact, to grasp a better idea of future command opportunities for navigators, taking a look at historical observations indicates not much has changed. In 1989, Lieutenant Colonel Larry Magnuson, a Master Navigator with over 3,000 flight hours, authored an Air War College study titled “The Future of the Air Force Navigator.” He indicated command opportunities exist, particularly within support squadrons, but the opportunities will only persist if three factors hold true: “1) current trends toward navigator commanders continue, 2) staff positions increase making the navigator more competitive for all commander positions, and 3) the rated supplement opportunities increase providing experience necessary to successfully compete for support commander positions” (Magnuson 1989). The 2014 reduction in force significantly decreased staff opportunities that must be manned with aircrew officers, called the rated supplement, which certainly does not bode well for navigators. However, Lieutenant Colonel Magnuson also remarked, “The path to promotion is an unidentifiable combination of



promotions, command, high level staff positions, and timing” (1989). Further, he stated the future of the Air Force navigator s directly affected by pilot manning, the rated supplement, staff positions, and technological advancement of aircraft (1989).

While staff opportunities were significantly slashed in 2014, the proportion of billets filled by navigators will remain strong if Air Force leadership decides to retain the pool of experienced pilots in operational flying assignments to curtail hollow force concerns. These troubles are alleviated by maintaining enough experience to properly develop younger pilots. Additionally, a surge in commercial airline hiring may cause a pilot shortage which frees available staff billets for navigators. The proportion of these staff positions available is historically favorable to navigators. In 1993, 35% of navigators held staff billets while only 24% of pilots served in staff capacities (Magnuson 1989).

Lieutenant Colonel Magnuson concluded his research of the future for Air Force navigators with a proposal to create a navigator career monitor position. The responsibilities of this position include compiling manpower statistics and liaising with major commands, advocating for career development programs, and providing navigators with education required to transition to alternate career paths in the Air Force (1989). In fact, transition programs used to exist which enabled rated officers to maintain aircrew currency while filling undermanned support positions in maintenance, security forces, and logistics. Known as “Volant Wrench,” “Volant Cop,” “Volant Store,” and “Volant Van,” these highly competitive programs enhanced both retainability and career

development (Magnuson 1989). Considering the dire need for Air Force maintenance officers, a program like “Volant Wrench” could not be more imperative.

## **Summary**

The literature review investigated previous research related to management of personnel and training associated with aircrew transition. It examined findings linked to manpower divestment, skillset transition, and navigator officer development through studies of major weapons system life cycle costs, readiness reporting, and a decision framework for manpower reallocation. Additionally, a historical analysis of career progression and command opportunities for rated navigators illustrated prolonged challenges which persist today. This literature is critical to crafting informed decisions which impact how and when KC-135 navigators are divested.

### **III. Methodology**

#### **Chapter Overview**

The purpose of this chapter is to describe how the Delphi process was applied in order to solicit and organize results regarding the best ways to divest the KC-135 navigator force. Anonymity of selected experts for the study was critical to ensuring data, opinions, and results were not skewed. Therefore, names, duty stations, job titles, and ranks are omitted from this discussion.

#### **Overview of Research Methodology**

In order to apply the Delphi method, it was necessary to organize strict protocol and structure. This involved a series of steps to formulate a framework. Ultimately, the task at hand encompassed selection of experts, explanation of the topic and Delphi process to those experts, formulation of questionnaires, feedback and re-questioning, and compilation of results to formulate a group consensus. In terms of protocol, experts were instructed to only communicate the results of their questionnaires through the study's facilitator, refrain from identifying themselves as part of the study, and abstain from speaking with peers about their questionnaires. Structurally, all questionnaire responses were transmitted only through the Delphi study facilitator, differing responses were relayed between experts, and each expert was instructed his identity would permanently remain anonymous.

The first and most important step was selection of key experts to participate in the series of questionnaires. In order to elicit opinions and information without bias due to

organization, rank, or position, these experts were well informed beforehand how the process would unfold. They were informed their identities and any identifiable information tied to them would remain confidential before, during, and after the research study. Additionally, experts were not told who was involved in the study, were encouraged not to discuss their involvement in the study, and were numbered in order to maintain anonymity. By the end of the first step, five experts were chosen based on breadth and depth of experience and knowledge and were assigned identifiers “Expert 1” through “Expert 5.”

The second step of the study established a foundation of where each expert stood by initiating the first round of questionnaires using the research questions in Table 3. Deliberately, the questions were provided without any supporting data. This was important in order to gather initial opinions from the experts before supplying further information in follow-up questionnaires.

The third step of the study involved identification of varying answers from the initial questionnaire, followed by consolidated feedback supported with factual data. After each round of questionnaires, any questions with which a consensus was reached would be pared out from future questionnaires in order to focus on arriving at conclusions. While desirable to reach unanimous decisions for each of the investigative questions, it was important to recognize the possibility one or more experts could fervently disagree, regardless of how many rounds of questionnaires and feedback were provided. In this case, after exhausting all means to reach compromise, the question

would be omitted from further questionnaires and varying positions would be incorporated in the study's analysis and results.

The final step of the Delphi method for this research study entailed compiling all of the expert opinions and data elicited through the sequence of questionnaires in order to draw conclusions. Since many of the investigative questions involved subjective criteria, it was important to document assumptions and limitations. The final recommendations would ultimately encompass a collection of the best analysis agreed upon by the panel of experts.

### **Assumptions**

Application of the Delphi method to solicit ideas, information, and opinions from the selected experts involves several assumptions. It is assumed that these participants will provide their honest stances to the research questions without pressure to the contrary based on their assigned organizations, ranks, or positions. Additionally, it is reasonable to assume information may exist related to the investigative questions which the selected experts cannot access or is classified in a manner in which restricts disclosure. While robust feedback is desired for this investigative study, it is also important to consider the limitation that expert subjects may fail to provide timely and thorough analysis due to time constraints caused by their jobs.

### **Description of Analyses**

Unlike studies which involve significant quantitative analyses through statistics, modeling, simulations, and calculations, this study lends itself more toward the use of

qualitative analysis. A key aspect of this analysis involves the relay of disagreement between experts in order to request rebuttals and eventually arrive at a consensus. While the experts may all quickly arrive at the same answer to a particular research question, it is possible other questions will demand many rounds of questioning before reaching a conclusion. In order to maintain objectivity and anonymity when gathering responses and performing analyses, all responses were relayed verbatim between the experts, and hand-written answers were transcribed into printed text. Additionally, the effect of experts abandoning their opinions based on views of the majority was prevented by only stating varying beliefs themselves, omitting how many experts offered the differing ideas.

## **Summary**

This chapter described how the Delphi process was applied in order to request information, analyze it, and arrive at conclusions for the most pragmatic methods for divestment of the KC-135 navigator force. The selected experts remain anonymous before, during, and after the study in order to prevent bias in data, opinions, and final results. Therefore, identities of the panel of experts were omitted from the discussion. This chapter further outlined the framework with which to question and re-question the panel, discussed assumptions and limitations to the provided feedback, and described the procedure for processing analysis. Careful adherence to the Delphi process methodology guaranteed the following analysis in as meticulous and unbiased manner possible.



## **IV. Analysis and Results**

### **Chapter Overview**

This chapter describes and explains the analysis and results derived from a series of questionnaires distributed to five experts through use of the Delphi method. Since this study involved an extensive set of investigative questions in order to arrive at a comprehensive solution to KC-135 navigator divestment, the results are organized one question at a time. Chapter V conclusions and recommendations summarizes these findings and prescribes the best way forward for the Air Force's transition of the KC-135 SOAR program and its navigator corps.

### **Question 1. How should navigators be divested from the KC-135?**

This question was the most debated of the investigative questions because it concerned timeframe and rate at which navigators should be divested from the KC-135 community. Upon initial questioning, Expert 1 and Expert 4 suggested phase out occur as close to KC-46 beddown as possible and at an aggressive pace. Expert 2, Expert 3, and Expert 5 recommended halting the pipeline of brand new inbound Combat Systems Officers and implementing third pilot SOAR training while divesting navigators through normal attrition. Expert 5 furnished Figure 5, Figure 6, and Figure 7 as possible courses of action. It is important to note Expert 5's COAs made the assumption a pilot is the most practical replacement to the navigator for the SOAR mission, though this assumption is further explored in [Question 3](#).



## COA #1

(Recommended)

### ■ Phased divestment of KC-135 Navigators

- Close KC-135 Navigator pipeline
- Freeze inbound PCS moves
- Divest w/natural attrition and retraining
- Develop pilot training plan
  - Complete SGTO
  - SOAR missions flown with 3<sup>rd</sup> pilot or Nav
- Mitigate manning loss
  - Convert attached 12M3F positions to 11M3F (6 positions)
  - Early deactivation of one ARS

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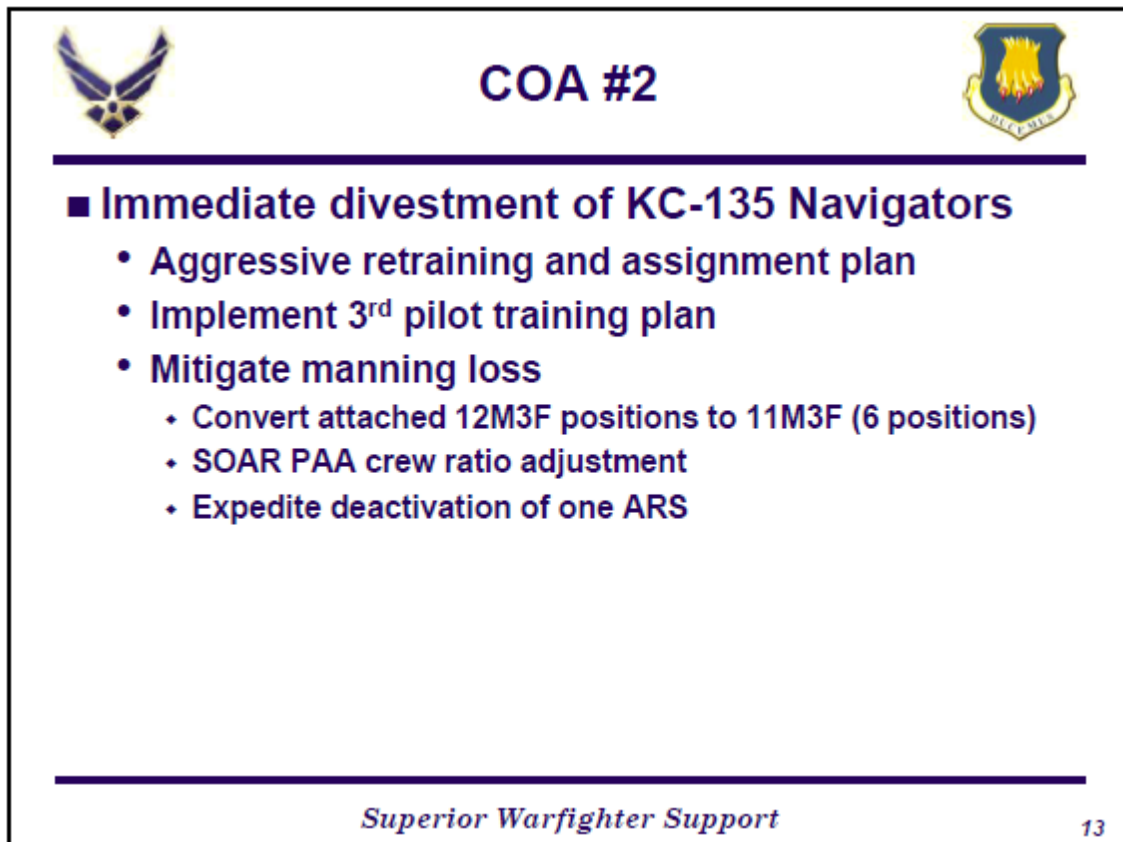
12

**Figure 5. Phased Divestment of KC-135 Navigators**

The first Course Of Action (COA), initially recommended by Expert 5 generally corroborated with the opinions of Expert 2 and Expert 3. Expert 5 asserted freezing new inbounds prevented aviators from training on a MWS with limited development opportunity, minimized operational risk to the SOAR mission transition otherwise amplified by simultaneous transition to the KC-46, and established a reasonable timeline for the Air Force to find new positions for existing navigators. This COA outlined a Small Group Tryout (SGTO) before training pilots in the navigator's duties and operating in parallel until the completion of navigator divestment. Additionally, Expert 5 mentioned recoding some of the administrative UMD positions from navigator billets



(12M3F) to pilot billets (11M3F) and decreasing the number of flying squadrons at McConnell Air Force Base from four to three to eliminate excessive administrative overhead.



**COA #2**

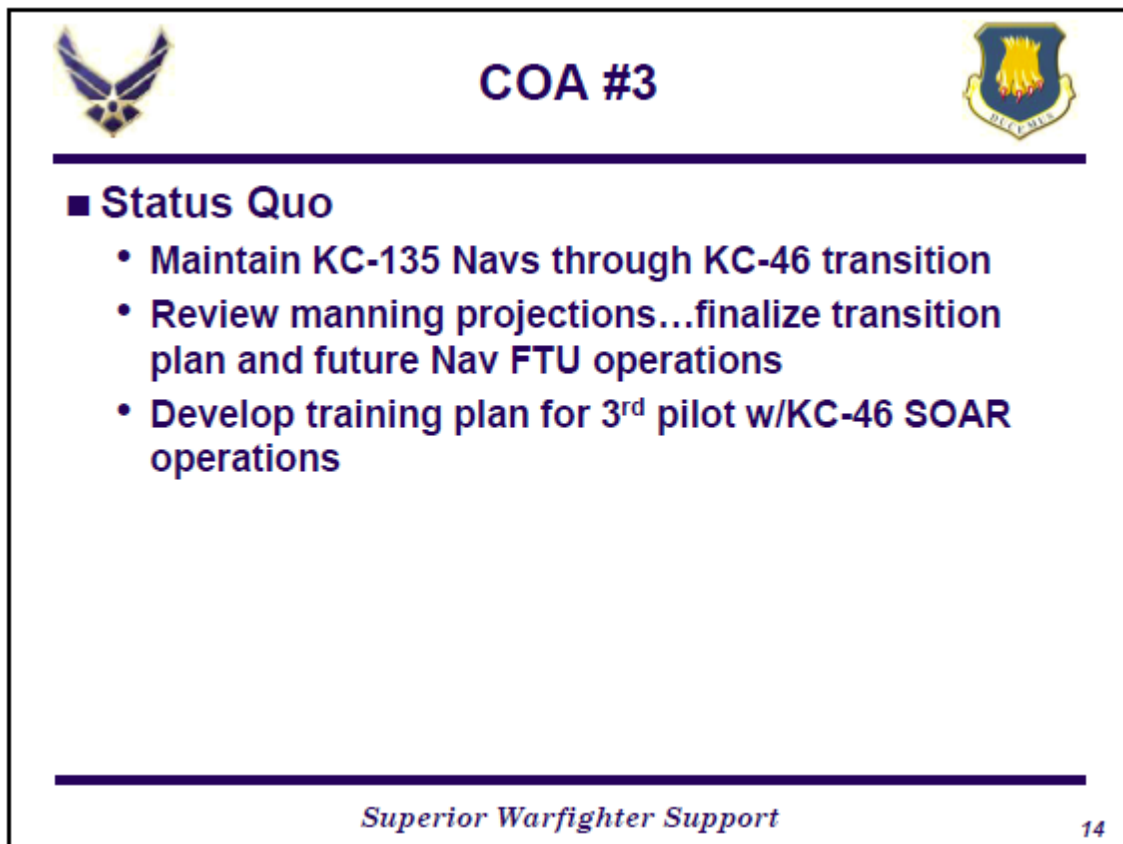
- **Immediate divestment of KC-135 Navigators**
  - Aggressive retraining and assignment plan
  - Implement 3<sup>rd</sup> pilot training plan
  - Mitigate manning loss
    - Convert attached 12M3F positions to 11M3F (6 positions)
    - SOAR PAA crew ratio adjustment
    - Expedite deactivation of one ARS

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**Figure 6. Immediate Divestment of KC-135 Navigators**

A second COA involved a more aggressive and immediate navigator divestment. None of the experts deemed this COA prudent due to the risk involved in transitioning SOAR too quickly, a likely scarcity of suitable assignment options in such a short timeframe, and an expected failure to successfully persuade higher headquarters to adjust the SOAR crew ratio. While this COA was unpopular among the experts, they all agreed converting the six administrative UMD positions would maintain more flexibility when

the suggested third pilot concept was fully implemented. Additionally, they agreed at the completion of the transition deactivating a flying squadron was necessary to maintain proper administrative complements. Expert 1 further noted that there is a plan to deactivate one of the flying squadrons upon KC-46 beddown, regardless of navigator divestment.



The slide is titled "COA #3" in large blue font at the top center. It features two logos: a stylized eagle on the top left and a shield with a flame on the top right. Below the title, a horizontal line separates it from the main content. The content begins with a section header "■ Status Quo" in bold blue font. Under this header is a bulleted list of three items, also in bold blue font: "Maintain KC-135 Navs through KC-46 transition", "Review manning projections...finalize transition plan and future Nav FTU operations", and "Develop training plan for 3<sup>rd</sup> pilot w/KC-46 SOAR operations". At the bottom of the slide, another horizontal line is followed by the text "Superior Warfighter Support" in a blue serif font, and the number "14" in the bottom right corner.

**COA #3**

**■ Status Quo**

- **Maintain KC-135 Navs through KC-46 transition**
- **Review manning projections...finalize transition plan and future Nav FTU operations**
- **Develop training plan for 3<sup>rd</sup> pilot w/KC-46 SOAR operations**

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**Figure 7. Divest KC-135 Navigators During KC-46 Beddown**

The third COA described by Expert 5 was initially supported by Expert 1 and Expert 4. This plan involved waiting until KC-46 beddown to phase out navigators and transition the SOAR mission. Expert 1 and Expert 4 acknowledged an aggressive transition might leave some navigators with limited career options. However, they

claimed it was more costly for the Air Force to replace navigators with pilots. Though navigators and pilots of the same rank and time in service are paid the same salary, Expert 4 indicated the initial cost to train a pilot was double that of a navigator and increased pilot requirements could additionally drive up flying hour costs. His observation of initial training costs was roughly accurate according to Table 4**Error!**

**Reference source not found..** Additionally, Expert 1 illustrated the history of significant delays to MWS beddowns which he claimed further supported waiting to transition the SOAR mission.

The main point of contention regarding whether to divest navigators sooner rather than closer to KC-46 beddown revolved primarily around life cycle cost and partially around development of those officers whose position would be eliminated. Through subsequent re-questioning and supplying the experts with each other's facts and opinions, discussion advanced to new levels. The experts each expressed their viewpoints whether the SOAR mission required a new pilot replacement for each navigator, if it mattered how long it takes before KC-46 beddown, and the potential cost incurred by the Air Force if navigators were left with few career options and underwent a Reduction In Force (RIF) or resigned commissions after fulfilling their active duty service commitments.

Expert 2, Expert 3, and Expert 5 maintained their initial stance through re-questioning and were adamant that earlier navigator divestment could take place at a lower cost because a new pilot would not be required to replace each divested navigator. In fact, Expert 2 stated the nature of McConnell Air Force Base as a super tanker Wing with four flying squadrons enabled it to absorb the SOAR mission with already assigned

personnel, regardless of whether six of the fifty navigator positions was converted to a pilot billet. Furthermore, Expert 3 noted the loss of over forty navigators would easily result in monetary savings, even with the cost of six additional pilots and associated flying hour and MPT costs.

Expert 4 was eventually convinced it made fiscal sense to divest navigators sooner rather than later, at which point he agreed to the COA for halting the inbound pipeline and gradually transitioning SOAR. However, Expert 1 brought up the Wing's DOC statement and suggested it would drive a one-for-one navigator replacement. The other experts conceded this was the case, as written, but claimed the DOC statement was based on an old standard. A large personnel shift like divestment of an entire crew position would dictate a new DOC statement, one with a crew ratio the other experts declared would not require more pilots. While still somewhat unsure, Expert 1 ultimately accepted it was possible to rewrite the DOC statement with a new crew ratio for the SOAR mission and also acknowledged flooding the assignment system with too many navigators all at once could lead to unintended consequences and a loss of experienced human capital. Interestingly, though all five experts eventually supported the phased divestment COA, their backgrounds did not appear to bias their initial opinions. Two pilots and one navigator initially supported the COA in Figure 5 while one pilot and one navigator initially supported the COA in Figure 7.

**Question 2. What are potential manpower, personnel, and training effects after navigators are phased out?**

Answers to this question varied significantly but included more additive feedback than disputes. In terms of manpower, the experts agreed the net loss of about one fourth of the officers assigned to the 22d Operations Group meant one of the four flying squadrons should be deactivated. Expert 3 indicated it would be difficult and inefficient to maintain levels of management in four squadrons with such losses. Aside from flying operations, officers hold key positions enabling training, readiness, standardization and evaluation, tactics, scheduling, safety, and executive administrative support. The experts agreed leveling manpower in an efficient manner necessitated operations with three flying squadrons instead of four.

Another manpower consideration concerned changes to authorizations in support roles. While the number of aircraft maintenance personnel is driven by the number of permanently assigned aircraft at the installation, support personnel such as aviation resource managers, intelligence operators, and aircrew flight equipment specialists are driven in-part by utilization. Though a decrease in navigators signals decreased work load for these personnel, Expert 5 suggested changes in UMD authorizations would be marginal. Expert 1 agreed and proposed aviation resource managers would experience the largest loss with the deactivation of a flying squadron.



Speaking to the personnel piece of MPT, Expert 4 asserted there should not be a problem with personnel experience levels post-divestment as long as the distribution of experienced pilots to inexperienced pilots remained healthy throughout the transition. In

contrast to past Air Force personnel reductions where a disproportionate amount of experienced aircrew were eliminated from the force, he pointed out how this divestment eliminates all navigators, experienced and inexperienced alike. The end result would not cause what is commonly referred to as the “bathtub” effect, where a shortage of personnel with a specific specialty and expertise causes turbulent manpower hurdles for years to come.

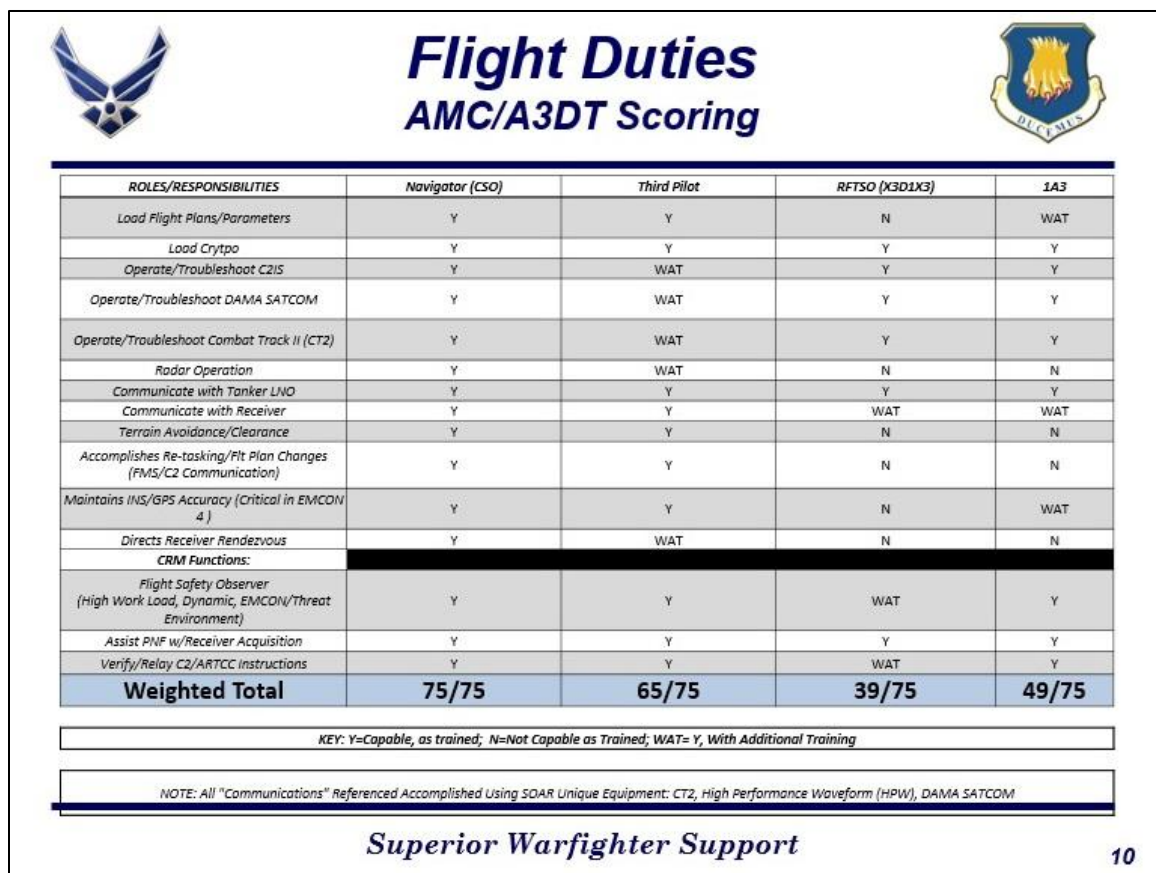
Expert 1 and Expert 3 stated training would experience the most significant changes during and after navigator divestment. Most notably, the experts declared the eventual shutdown of the navigator formal training unit, as well as contracted instruction taught by KC-135 simulator specialists. Moreover, replacement of navigators called for transition of SOAR training from instructor navigators to their replacements. Expert 2 suggested this transition would be easier than it sounded. Based on findings from a February 2014 third pilot test case, which involved hands-on SOAR instruction for six pilots by instructor navigators on several flights, he was confident a pilot’s undergraduate training provided baseline knowledge which reduced the amount of training required. In fact, Expert 2 affirmed training a new pilot in the SOAR mission would only require one day of ground training and one hands-on flight. Furthermore, he advised third pilots, presumably those with instructor qualification, could take over instruction of the course with as little as 15 hours of SOAR flight experience. The other experts agreed with Expert 2’s assertions with the exception of Expert 5, who summarily agreed but suggested 15 hours of SOAR flight experience might be a little too aggressive.

**Question 3. What is the most feasible replacement for navigators in the SOAR mission? What are the cost implications?**

Though all of the experts initially agreed based on the importance and complexity of SOAR missions that an additional pilot was the most suitable navigator replacement, Expert 5 thought it was important to additionally discuss the options of communications systems operators (specialty code X3D1X3) and KC-135 boom operators (specialty code 1A0X1). He supplied data from AMC which scored ground and flight capabilities for alternatives to the SOAR navigator found in Figure 8 and Figure 9.

<div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: center;"> <h2 style="margin: 0;">Ground Duties</h2> <h3 style="margin: 0;">AMC/A3DT Scoring</h3> </div>  </div>				
ROLES/RESPONSIBILITIES	Navigator (CSO)	Third Pilot	RFTSO (X3D1X3)	1A3
OCS Staff Planner	Y	WAT	N	WAT
AOC SOLE: CJSOAC/JSOTF/JSOC Tanker Liaison, Mission Planner/Executer	Y	WAT	N	N (Officer Billet)
Receiver Contracts/Blue Force De-Confliction Plan	Y	WAT	N	N (Significant Training Would be Required)
Generate/Review Flight Plans	Y	WAT	N	WAT
Pre-Mission Brief (SOAR Specific Procedures)	Y	Y	N	WAT
C2 LNO (Usually On location): Real Time Airspace, Tanker/Receiver Coordination	Y	WAT	N	N (Officer Billet)
Brief/Plan AAR in EMCON/CDO Environment	Y	Y	N	WAT
Pre-flight C2 Equipment	Y	WAT	Y	Y
Fill Rated UMD Billets in Wing	Y	Y	N	N
<b>Weighted Total</b>	<b>45/45</b>	<b>33/45</b>	<b>5/45</b>	<b>17/45</b>
<p>KEY: Y=Capable, as trained; N=Not Capable as Trained; WAT= Y, With Additional Training</p> <p>"Weighted Total": Y=5, WAT=3, N=0 ---- Score/Total Possible</p>				
<p><b>Superior Warfighter Support</b></p> <p>8</p>				

**Figure 8. AMC SOAR Ground Duty Scoring**



**Figure 9. AMC SOAR Flight Duty Scoring**

While AMC's scoring agreed with initial assertions that a pilot was the most appropriate navigator replacement, the experts believed AMC's scoring was biased and vastly underestimated training already incorporated in the pilot program such as radar operation, rendezvous, flight planning, and expertise required for staff positions. Expert 3 ran separate scoring at the Operations Group level against pilot training syllabi and furnished ground and flight capability assessments illustrated in Figure 10 and Figure 11. The new scoring largely validated scoring of the communications specialists and boom operators but more remarkably illustrated a disparity in AMC's assessment of pilot



abilities versus the Operations Group's judgment. The other experts accepted Expert 3's scoring as a more appropriate valuation of navigator replacement aptitude.

# Ground Duties

## 22 OG Scoring

ROLES/RESPONSIBILITIES	Navigator (CSO)	Third Pilot	RFTSO (X3D1X3)	1A3
OGS Staff Planner	Y	Y	N	WAT
AOC SOLE: CJSOAC/JSOTF/JSOC Tanker Liaison, Mission Planner/Executer	Y	Y	N	N (Officer Billet)
Receiver Contracts/Blue Force De-Confliction Plan	Y	Y	N	N (Significant Training Would be Required)
Generate/Review Flight Plans	Y	Y	N	WAT
Pre-Mission Brief (SOAR Specific Procedures)	Y	Y	N	WAT
C2 LNO (Usually On location): Real Time Airspace, Tanker/Receiver Coordination	Y	Y	N	N (Officer Billet)
Brief/Plan AAR in EMCON/CDO Environment	Y	Y	N	WAT
Pre-flight C2 Equipment	Y	WAT	Y	Y
Fill Rated UMD Billets in Wing	Y	Y	N	N
<b>Weighted Total</b>	<b>45/45</b>	<b>43/45</b>	<b>5/45</b>	<b>17/45</b>



KEY: Y=Capable, as trained; N=Not Capable as Trained; WAT= Y, With Additional Training

"Weighted Total": Y=5, WAT=3, N=0 ---- Score/Total Possible

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**Figure 10. OG SOAR Ground Duty Scoring**

<div>  <div> <h1>Flight Duties</h1> <h2>22 OG Scoring</h2> </div>  </div>				
ROLES/RESPONSIBILITIES	Navigator (CSO)	Third Pilot	RFTSO (X3D1X3)	1A3
Load Flight Plans/Parameters	Y	Y	N	WAT
Load Crypto	Y	Y	Y	Y
Operate/Troubleshoot C2IS	Y	WAT	Y	WAT
Operate/Troubleshoot DAMA SATCOM	Y	WAT	Y	WAT
Operate/Troubleshoot Combat Track II (CT2)	Y	WAT	Y	WAT
Radar Operation	Y	Y	N	N
Communicate with Tanker LNO	Y	Y	Y	Y
Communicate with Receiver	Y	Y	WAT	Y
Terrain Avoidance/Clearance	Y	Y	N	N
Accomplishes Re-tasking/Flt Plan Changes (FMS/C2 Communication)	Y	Y	N	N
Maintains INS/GPS Accuracy (Critical in EMCON 4)	Y	Y	N	N
Directs Receiver Rendezvous	Y	Y	N	N
<b>CRM Functions:</b>				
Flight Safety Observer (High Work Load, Dynamic, EMCON/Threat Environment)	Y	Y	WAT	Y
Assist PNF w/Receiver Acquisition	Y	Y	Y	Y
Verify/Relay C2/ARTCC Instructions	Y	Y	WAT	Y
<b>Weighted Total</b>	<b>75/75</b>	<b>69/75</b>	<b>39/75</b>	<b>42/75</b>
KEY: Y=Capable, as trained; N=Not Capable as Trained; WAT= Y, With Additional Training				
NOTE: All "Communications" Referenced Accomplished Using SOAR Unique Equipment: CT2, High Performance Waveform (HPW), DAMA SATCOM				
<div> <b>Superior Warfighter Support</b> <div>11</div> </div>				

**Figure 11. OG SOAR Flight Duty Scoring**

The experts questioned reached a consensus that communications specialists lacked requisite airmanship and boom operators required substantial additional training to fulfill the navigator's role in the SOAR mission. Despite the significant cost savings of replacing navigators with enlisted operators, the experts agreed these options could not ultimately accomplish SOAR mission requirements. Therefore, the focus of cost shifted toward comparing the present cost of navigator employment with the potential cost of pilot replacements. Expert 1 furnished an annual estimate for 2015 as shown in Table 6.

**Table 6. Annual Aircrew Cost Estimate**

<b>Annual Cost Estimate for Aircrew</b> (Based on O-3 with 6 years of service; 4 years aviation service)		
	<b>Navigator</b>	<b>Pilot</b>
Basic Pay *	\$ 65,635	\$ 65,635
Basic Allowance for Subsistence (BAS)	\$ 3,041	\$ 3,041
Aviation Incentive Pay **	\$ 2,472	\$ 2,472
Basic Allowance for Housing (KIAB) ***	\$ 15,588	\$ 15,588
Initial Training Costs (Annual Average) ****	\$ 65,061	\$ 74,935
O&M Cost for Programmed Flight Hours *****	\$ -	\$ 7,710
Cost per Aviator	\$ 151,797	\$ 169,381
Aircrew Required	50	6
<b>Total</b>	<b>\$ 7,589,828</b>	<b>\$ 1,016,283</b>
* Assumes annual basic pay for O-3 with 6 years of service based on 2015 military pay chart ** Based on 2015 annual aviation pay with 4 years aviation experience *** Based on 2015 BAH at McConnell AFB for O-3 (average of dependent and non-dependent rate) **** Based on Table 4 Initial Aircrew costs averaged across active duty service commitments (6 year commitment for Navigators; 10 year commitment for Pilots) ***** Based on FY14 O&M program with 30 hours/pilot and \$257 reimbursement per flight hour		

In Table 6, Expert 1 explained several assumptions were employed to generate a basis from which to compare average costs for navigators and pilots. Of note, estimates were based on an aircrew member with an average experience level as a Captain with six years of commissioned service and four years of aviation service. Additionally, initial training costs took into account the average annual costs of undergraduate pilot and navigator training from Table 4 spread across the associated service commitment durations, six years for navigators and ten years for pilots. Since Operations and Maintenance (O&M) flight hours are programmed based on the flight time required to train pilots annually, this additional cost was added for each pilot; navigators do not incur this cost since their training is not a limiting factor and is accomplished utilizing already programmed O&M flight hours. The other experts agreed the estimates in Table 6 were based on reasonable assumptions. They indicated the COA which recodes six pilots into

navigator positions would save the Air Force about \$6.5 million annually. Additionally, not accounting for the opportunity costs from failing to retain navigators post-divestment, these estimates suggest about 44 pilots could replace the 50 navigators for the same cost.

**Question 4. What changes are required to Air Force regulations to transition the SOAR mission?**

All experts agreed after Air Force level approval of reassignment of navigator SOAR duties to a suitable replacement, changes to regulations would follow suit relatively quickly and easily. Expert 3 noted the three parent Air Force Instructions (AFI) which delineated SOAR navigator training, evaluation, and flight duties: AFI 11-2KC-135 Volume 1, AFI 11-2KC-135 Volume 2, and AFI 11-2KC-135 Volume 3. While he didn't believe it was beneficial to the discussion to examine each of the multitude of navigator AFI references, he summarized key concepts from the three primary AFIs.

In AFI 11-2KC-135 Volume 1, Expert 3 suggested pilots already accomplish the continuation training required for navigators, and the only additional training reference involved SOAR. He indicated the AFI organizes navigator training into three phases: basic navigator, SOAR navigator, and instructor navigator. Of these phases, Expert 3 stated the basic navigator and instructor navigator phases could be removed entirely after SOAR transition, and the SOAR navigator phase would be modified for the pilot's needs along with associated Chapter 4 ground and continuation training requirements. The section defining the SOAR navigator phase is depicted in Figure 12.

2.10.2. SOAR Navigator. KC-135 Navigators complement designated SOAR units as additional crewmember. SOAR navigator training is conducted in-unit by 22 ARW, McConnell AFB. SOAR Navigators will be basic-qualified and will maintain MR status for the SOAR mission (USAFWS SOAR Navigators are not required to maintain MR status). See ground and continuation training requirements in **Chapter 4**.

2.10.2.1. SOAR Navigators may fly any sortie with an FMS-3 suite installed.

2.10.2.2. SOAR Navigators non-current in SOAR RV (S036) must fly with a current SOAR IN to regain currency. Non-SOAR sorties may still be accomplished while non-current in only S036.

### **Figure 12. SOAR Navigator Training Phase (11-2KC-135V1)**

The experts agreed AFI 11-2KC-135 Volume 2, would be the simplest to update. Expert 3 plainly stated Chapter 3, the instructions regarding navigator evaluations, could be removed. Since SOAR is a certification rather than a qualification, its requirements are not evaluated per Chapter 3. Expert 2 identified two evaluation criteria specific to navigators in which pilots are not evaluated: manual gear extension and manual flap extension (AFI 11-2KC-135V2 2010). However, those capabilities were only required for initial basic navigator or initial instructor evaluations and are already evaluated for boom operators. All experts agreed it was not necessary to levy these evaluation criteria on navigator replacements.

The third AFI referenced by Expert 3 regarded KC-135 Operations Procedures in AFI 11-2KC-135 Volume 3. The section defining the navigator's role was incorporated in the KC-135 aircrew complement. Figure 13 shows how the four-person crew is defined for the SOAR mission and outlines in 6.60.4 the duties which would presumably be performed by a third pilot replacement.

<p><b>6.60. Aircrew Complement.</b> At a minimum, KC-135 aircraft will be operated using three-person procedures (two pilots and one boom operator). Commanders may designate that a mission use four-person procedures (minimum two pilots, one navigator and one boom operator) if navigator currency/training requires (N/A ANG). When a mission is scheduled as four-person, a “Navigator suite or B-Kit” must be installed at the navigator station.</p> <p>6.60.1. OPLAN 8010 will be flown three-person.</p> <p>6.60.2. SOAR will be flown four-person.</p> <p>6.60.3. Basic Navigator. Navigator’s duties include, but are not limited to, assist in mission planning/study, operating equipment at duty station, and functioning as backup to the pilot team for navigation, rendezvous and communication duties. Pilots will retain full responsibility for all navigation and rendezvous duties.</p> <p>6.60.4. SOAR Navigator. Navigator’s duties (on both SOAR and Non-SOAR missions) include mission planning/study, operating equipment at duty station, and functioning as crew lead for navigation, rendezvous and communications duties as directed by appropriate flight manuals and mission directives. Pilots provide backup for all navigator duties.</p>
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**Figure 13. KC-135 Aircrew Complement (11-2KC-135V3, 124-125)**

Expert 5 additionally mentioned AFI 11-2KC-135 Volume 3, Addenda C, which specifically defines SOAR procedures. Distribution of the Addenda C is limited to those read into the SOAR program, but updating it to account for a replacement to the navigator would only involve substituting references to the navigator with references to the new operator. All of the experts agreed this contextual crew position name replacement was the fundamental modification for each of the AFIs.

**Question 5. How will the Unit Manning Document (UMD) need to be restructured to support the new SOAR construct?**

This question generated the quickest consensus. Upon initial questioning, each of the experts suggested the UMD was more driven by the DOC statement’s crew ratio requirements than anything else. Therefore, any changes to the DOC statement due to navigator divestment would drive UMD changes. However, in the Question 1 discussion

of the best courses of action for SOAR transition, the experts all agreed recoding administrative navigator positions in the UMD would slightly increase the flexibility of pilot replacements when navigator elimination was complete. These administrative positions, often referred to as “attached” positions, create billets for aviators but are not considered line flyers. In other words, the attached positions are filled over and above DOC statement requirements. While only a minor explicit change, the experts reached a consensus that six administrative positions held by navigators existed which would be suitable pilot positions after SOAR transition. These UMD authorizations coded with a navigator 12M3F AFSC would be changed to a pilot 11M3F AFSC.

**Question 6. How will navigator replacements be trained and SOAR certified?**

Answers to this question initially varied significantly. Expert 2 and Expert 3 broadly stated navigator replacements should attend formal certification course conducted exclusively by the 22d Operations Group SOAR staff unit, including both ground and flight training. Expert 1 did not initially weigh in on who would conduct the instruction, but believed the training was best conducted using home station weekly SOAR training flights rather than on biannual multi-lateral training exercises. He debated that SOAR instruction would better be retained on home-station missions rather than at off-station exercises due to the familiar mission planning experience.

Expert 4 presented the navigator SOAR certification syllabus, roughly consisting of one duty day of ground training followed by one flight, and suggested applying the same syllabus to navigator replacements. He additionally suggested it did not matter whether flights were conducted at home station or abroad. Since the program would be



structured with training folders and organized with specific instruction points other flying certification programs, replacements would be held accountable for attaining all requisite SOAR expertise.

Expert 5 agreed with Expert 4, further stating off-station SOAR exercises usually offered many flights over a period of weeks which might actually present more robust training through repetition and achieving more than the syllabus requires. Also, Expert 5 offered the most comprehensive training plan, including when to transition instruction of the program from navigators to trained third pilot replacements. Though notional, Table 7 illustrates Expert 5's suggestion for training navigator replacements and eventually transitioning control of instruction to those replacements.

**Table 7. Navigator Replacement Training Timeline**

	Year 1				Year 2			
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Replacements Instructed	8	8	12	14	16	18	18	18
Navigator Instructors Required	8	8	8	8	6	4	2	0
Replacement Instructors	0	0	4	6	10	14	16	18

He noted this timeline was based on home station training flights alone since off station exercises occur roughly twice a year but not according to a predictable timeline. He said training flights take place approximately twice per week but a maximum of 18 trained replacements was reasonable when considering cancelled flights due to weather or maintenance and extra flights for students failing to grasp the instruction in a timely manner. Additionally, Expert 5 suggested training fewer students at first, presumably initial replacement cadre, then allowing them to gain SOAR experience for two quarters before gradually introducing them as instructors and phasing out navigator instructors.



By the end of the discussion on how to train and certify navigator replacements, Expert 2 and Expert 3 reached a consensus with the other experts that the existing navigator SOAR syllabus could be applied to navigator replacements. They agreed Expert 5's timeline sounded reasonable but would probably require real-time adjustments. Also, they concluded it made sense to maximize instruction by utilizing both home station flights and off-station exercises to meet syllabus requirements. Finally, the experts reached a compromise on who should train replacements. Whereas Expert 2 and Expert 3 wanted all instruction originating from the 22d Operations Group SOAR unit, the other experts believed the unit was too small to handle the volume of instruction necessary and all instructors across the flying squadrons should also be employed. The solution reached involved relying on the specialized SOAR training unit as much as possible throughout the transition but specifically for the initial non-navigator replacement cadre.

**Question 7. How will the assignment system handle KC-135 navigators from various year groups? Where will they go? How will they accrue gate months?**

Expert 1 initially stated he thought the majority of navigators would be reassigned to fly special operations aircraft, specifically the U-28 and AC-130, depending on how many years of experience they had accrued in the KC-135. However, Expert 3 rebutted with further information that though there was a manning need within special operations over the past several years, many of those positions were filled by transitioning C-130 legacy navigators and the need had been satisfied. However, the projected shortage resided within the B-52 community. While these two experts discussed specific job

openings for the majority of divested navigators, the other three experts spoke more broadly regarding career timing and exhausting all assignment opportunities.

Experts 2, 4, and 5 centered the discussion on gate months, the minimum number of months serving in an operational flying billet required to maintain Aviation Career Incentive Pay (ACIP). Primarily, those navigators who had not yet served eight years of operational flying would not continue to receive ACIP through 18 years of service if reassigned to a non-operational flying position. Those more senior Captains and Majors who had fulfilled the first 96-month flying gate would likely find themselves transitioning to staff positions and would never return to flying again while the younger navigators would retrain on another aircraft or fill positions allowing them to earn their ACIP. Despite saving the Air Force a significant sum of money by prohibiting some navigators from attaining the 96-month flying gate, the service risks retaining many of these officers due to demands in the private sector for their training and aviation experience. This is especially true for pilots, and the Air Force has traditionally enabled aviators to meet this ACIP milestone in order to maintain operationally savvy personnel and fill rated supplement requirements.

After exhausting the flying gate discussion, all of the experts agreed there were many operational flying possibilities available to the younger navigators, all of which they thought should be sought after to efficiently and effectively divest the force. While the sharper experienced navigators could compete for undergraduate flying training programs to become pilots or fly unmanned aircraft, the remainder of the experienced instructors would most likely fill openings as CSO instructors at Naval Air Station

Pensacola, and some would become Air Mobility Liaison Officers (AMLO). The younger navigators had fewer options and would transition to fill needs in other aircraft such as the B-52, RC-135, MC-130, AC-130, and U-28. Although there is a projected need for B-52 navigators in the coming years, there are several ways AFPC could apportion KC-135 navigators, including double-billeting UMD authorizations in one or more of the aforementioned aircraft until manning stabilizes or retaining them in the tanker until there are manning vacancies.

Aside from the flying gate milestone delineating those navigators who would never fly again from those who would be retrained, the experts cautioned reassignment of too many navigators in a short timeframe. They suggested attrition at a conservative pace in order to allow time for suitable openings to present themselves and make appropriate personnel pairings. Additionally, the experts reached a consensus cautioning application of a divestment plan which would leave navigators all undergoing reassignment at the same time. Such a scenario, they warned, would likely cause AFPC to inefficiently force shape a significant number of navigators out of the Air Force. In other words, while personnel typically remain on a “Vulnerable to Move List” until AFPC can match them to an assignment, if the Air Force waits too long to divest navigators, then the KC-46 could complete its beddown and eliminate all funded navigator billets. If a large number of KC-135 navigators still exists at this point, the Air Force’s hand would likely be forced to eliminate personnel rather than pay officers without jobs to perform.

## **Summary**

Applying the Delphi method to elicit information regarding navigator divestment spurred on a great deal of debate and discussion. Though there was potential for ardent disagreement and diverging ideas, largely the experts challenged and strengthened one another's ideas to arrive at shared conclusions. The greatest debate involved the best COA for navigator divestment and ultimately supported closing the pipeline of inbound navigators, a phased divestment with normal attrition, and recoding administrative navigator positions to pilot billets. The experts also collectively agreed pragmatic navigator divestment called for the deactivation of one flying squadron and believed a pilot was the most suitable navigator replacement. Finally, they concluded AFI modification was relatively trivial, standing up a SOAR transition certification program was straightforward and attainable, and assignments exist for all navigators, as long as the attrition timeline is adequate.

## **V. Conclusions and Recommendations**

### **KC-135 Navigator Divestment Using the Delphi Method**

The Delphi process proved successful as a method to elicit information from a panel of subject matter experts without pressure to accept one another's viewpoints. It broke down complex decisions involving both objective and subjective criteria in order to make important decisions and arrive at well-informed conclusions. While the determined results largely supported the initial hypotheses, the investigative questions stimulated discussion and produced much more in-depth and fact-based rationale to support the initial premise than expected. The following conclusions summarize the findings of those research questions.

#### **Summary of Research Questions and Answers**

##### ***Answer to Question 1. How should navigators be divested from the KC-135?***

Experts ultimately supported a COA which halts the pipeline and permanent change of station of inbound navigators as soon as possible, deactivates one of the four McConnell Air Force Base flying squadrons, introduces a SOAR transition program, and reassigns presently assigned navigators through normal attrition and retraining. The panel also agreed it was necessary to reexamine the DOC Statement and adjust the crew ratio to account for the navigator divestment. Finally, the experts suggested recoding six staff UMD billets from navigator positions to pilot positions in order to maintain critical administrative functions.

***Answer to Question 2. What are potential manpower, personnel, and training effects after navigators are phased out?***

The panel believed manpower would see the greatest effect due to navigator divestment. Specifically, they asserted deactivation of one flying squadron as the appropriate COA to efficiently reorganize the flying units after the loss of 50 officers. Though they believed manpower losses to support personnel would be minimal, loss of a flying squadron would primarily reduce aviation resource management personnel. In terms of personnel effects, the effects would be minimal since officers of all ranks and experience levels would be eliminated equally. Finally, the training effects involved included the eventual shutdown of the navigator Formal Training Unit, as well as its associated contracted simulator instruction, and the standup of a SOAR transition training program to transfer control of the mission to navigator replacements.

***Answer to Question 3. What is the most feasible replacement for navigators in the SOAR mission? What are the cost implications?***

The panel agreed a pilot is the most feasible replacement for the navigator. While cheaper, they concluded communications specialists and boom operators do not have the requisite training to effectively take on the SOAR mission. One expert estimated the replacement of navigators with pilots saves approximately \$6.5 million annually.

***Answer to Question 4. What changes are required to Air Force regulations to transition the SOAR mission?***

Among the AFIs which require modification are AFI 11-2KC-135 Volume 1, AFI 11-2KC-135 Volume 2, and AFI 11-2KC-135 Volume 3, as well as its associated Addenda C. In addition to replacing references to navigators with references to their

replacements, the expert panel recommended removing basic navigator and instructor navigator training phases from Volume 1, while redefining the SOAR certification program. In Volume 2, all references to navigator evaluation criteria must be removed. Lastly, Volume 3 requires new explanation of the crew complement to account for elimination of navigators and necessity of a fourth crew member on SOAR missions.

***Answer to Question 5. How will the Unit Manning Document (UMD) need to be restructured to support the new SOAR construct?***

Quite simply, the consensus reached indicated most changes to the UMD are driven by DOC Statement crew ratio and PAA amendments. The only changes due to restructuring of the SOAR program involve recoding critical staff positions previously assigned to navigators. These six billets must change from 12M3F to 11M3F AFSCs.

***Answer to Question 6. How will navigator replacements be trained and SOAR certified?***

The experts agreed navigator replacements needed initial instruction to earn SOAR certification but additionally would have to eventually take over the certification program themselves. They eventually reached agreement that the 22d Operations Group SOAR unit would begin instructing navigator replacements and would subsidize with outside help from flying squadron instructors. After approximately six months gaining SOAR experience, navigator replacements would begin taking over instruction duties alongside the navigator instructors who would be phased out by the end of two years. This instruction would take place on both home station training missions and off-station exercises with a goal of eventually training about 18 navigator replacements each quarter.

***Answer to Question 7. How will the assignment system handle KC-135 navigators from various year groups? Where will they go? How will they accrue gate months?***

It was agreed that the assignment system could not efficiently and effectively handle reassignment of all KC-135 navigators at once. However, over a period of time several options exist including attending undergraduate flying training, becoming an Air Mobility Liaison Officer, instructing CSOs at the Formal Training Unit, retraining on other aircraft, or transitioning to staff or other non-operational specialties. While many of these options allow for younger navigators to continue accruing gate months to earn ACIP, the older navigators most likely would discontinue aviation service and transition to staff roles or other non-aviation specialties.

**Study Limitations**

Some of the limitations of this study included restricted access to strategic planning information at the Air Force level, limited knowledge of AFPC manpower forecasts, and lack of control over already programmed budgetary decisions affecting personnel decisions. While the aforementioned solutions offer a comprehensive approach to efficient reallocation of KC-135 navigators, it is possible these recommendations could result in unintended consequences due to personnel divestment on other major weapons systems and higher level long term plans. Considering 2014 AFPC force reductions, especially among staff positions, fewer options may exist for reallocation of aircrew. This study was conducted independent of findings related to the introduction of the KC-46 Pegasus. It is possible, however, that the Air Force possesses



other informed plans which link navigator divestment to the KC-46 beddown timeline, despite assertions it would only impose greater risk to the SOAR mission. Since an expert from AFPC was not involved in the Delphi study for this thesis, it is possible additional data exists which would better inform navigator divestment decisions.

### **Recommendations for Action**

Based on this research, the Air Force should consider discontinuing the assignment of KC-135 Navigators to McConnell Air Force Base as soon as possible and initiate transition of the SOAR mission to pilots. Additionally, the 22d Operations Group should deactivate one flying squadron, recode the UMD to retain administrative capabilities, request an appraisal of the DOC statement, and begin the process of proposing revisions to Air Force regulations and requesting manning projections from AFPC. If the Air Force waits too long to divest the navigator corps, it could drive inefficient personnel reductions rather than carefully planned ways to capitalize on already trained and experienced aircrew investments.

### **Recommendations for Future Research**

This research incited many ideas for future research. Among them are studies on the relationship between manning and tasking of units with multiple mission sets, further research on how best to efficiently divest aircrew, efficacy of manpower reallocation and retraining programs, and minimizing redundant processes in Air Force “super” wings. In order to study the relationship between manpower allocations and tasking, there is much to learn from how the Commanders Apportionment and Allocation Plan (CAAP) accounts for units with multiple mission sets or unique differences between aircraft units

which should drive tasking considerations. For instance, while the SORTS is strictly a readiness reporting tool, is it reasonable to consider this readiness system when accounting for the CAAP? Further, it is beneficial to study units whose formal training units are collocated with its operational units since a significant amount of its resources are either in training or conducting instruction for that training.

Another recommendation for future research involves further study into how the Air Force divests personnel, especially aircrew in whom it has invested substantial resources training. It may be necessary to study the relationship between aircrew divestment and the ever-repeating force reductions and growth. Colonel John Wissler suggests the military appropriately prioritizes defense capability over efficiency when he states, “Warfare is an endeavor of absolutes, and the absolute requirement is mission effectiveness” (2009). To this end, further research might investigate proper balance of capability and cost and at what point manpower reductions become a defense capability problem.

This research alluded to former manpower reallocation and retraining programs like the Volant Wrench, Volant Cop, Volant Store, and Volant Van programs which retrained aviators into career fields with severe manning shortages. One might suggest either reactivation of these programs or studies into new programs which would address current Air Force needs. Such studies could also identify innovative ways to streamline the Air Force budget by retraining and reallocating human capital in order to increase the ability to recapitalize the fleet and invest in next generation defense acquisitions.

Lastly, as the Air Force Chief of Staff calls for new ideas to streamline the force without sacrificing capabilities, further research into minimizing redundant processes is

imperative. One such study might conduct manpower studies at bases with multiple squadrons of identical personnel authorizations. This research recommended deactivating one of the 22d Operations Group's four flying squadrons. However, it stopped short of examining the most efficient unit manning makeup. Each of the flying squadrons in this case provides identical training, scheduling, readiness, tactics, and safety processes, but further research could identify whether unit consolidation would decrease overall workload. Since this thesis offered a comprehensive approach to manpower divestment, it uncovered a myriad of potential subjects for future research.

### **Significance of Research**

This thesis applied data and expert opinions to determine the most pragmatic way to divest KC-135 SOAR navigators. Most significantly, the conclusions of the panel of experts queried supported the hypothesis that current Air Force plans to continue minting KC-135 navigators through Fiscal Year 2017 are inefficient, problematic, and operationally risky. Further, the recommended courses of action offered an avenue to both effectively transfer operational capabilities for the KC-135's most complex mission and save costs while preserving development and employment of skilled and experienced aviators. How the Air Force continues to either promote or stifle the careers of navigators will send a clear message to Air Force CSOs and could pose future retention problems if it continues to repeat past personnel management mistakes.

This research also offers significant findings through its approach. Dynamic manpower decisions do not take place in a vacuum, and reliance upon multiple experts to formulate long term, sensible plans is fundamental to effective management of United

States defense forces. Too often the Air Force appears to take a reactive approach to budgetary constraints rather than a proactive approach. This research illustrates application of a systems approach to thinking essential to formulation of proactive strategies. While the topic of discussion in this case was a navigator, an element of the KC-135 Major Weapon System, thorough study of a system's or mission's requirements, needs, and capabilities is necessary to ongoing management throughout its life cycle. This study's systems approach successfully applied the Delphi process to reveal potential divestment missteps and offer efficient, innovative, and comprehensive solutions.

## Appendix A. Sample DOC Statement (AFI 10-201)

SORTS DOC STATEMENT					
EFFECTIVE DATE 1998 04 01	SUPERSEDES 1997 04 01	MAJCOM/OPR ( <i>Office Symbol and Phone No.</i> ) HQ AETC/SVX DSN 487-3410			
<b>I. ( ) UNIT IDENTIFICATION</b>					
MEASURED UNIT 0325 SVS	HOME LOCATION TYNDALL AFB, FL			UNIT UTC LWRRZ	UIC FF300C
DOC MISSION TITLE SERVICES-PRIME RIBS-MOBILITY					GEO LOC XLWU
DOCID UM27	DOCNR 1	<input checked="" type="checkbox"/> PRIMARY MISSION	<input type="checkbox"/> SECONDARY MISSION	<input type="checkbox"/> TERTIARY MISSION	
<b>II. (U) MISSION IDENTIFICATION</b>					
A. (U) MISSION TASKING NARRATIVE. THIS UNIT HAS A WARTIME MISSION TO: DEPLOY PRIME RIBS WORLDWIDE TO PROVIDE DIRECT COMBAT SUPPORT TO AF OPERATIONAL FORCES IN THE AREAS OF FOOD SERVICES, BILLETING, WARTIME MORTUARY OPERATIONS, FIELD LAUNDRY SERVICES, TACTICAL FIELD EXCHANGE, AND FITNESS AND RECREATION.					
B. (U) MISSION SPECIFICS		C. (U) UTCs REQUIRED TO SUPPORT		D. (U) DIRECT SUPPORT UNITS UICS	
RESPONSE TIME    XX HOURS		LWRR2 (2)		N/A	
SOURCE                    (para)					
AIRCRAFT / MISSILE UNITS ONLY					
MDS AND SERIES: (    )					
SORTIES/FLYING HRS ( <i>WMP</i> ): N/A					
E. (U) ( <i>Optional</i> ) OPLANS TASKED TO SUPPORT:					
REF AETC WMP-3					
<b>III. (U) MEASURED RESOURCE AREA</b>					
A. PERSONNEL					
<input checked="" type="checkbox"/> TOTAL            UMD ( <i>OR</i> )		<input checked="" type="checkbox"/> X UTC		<input checked="" type="checkbox"/> X CRITICAL ( <i>AFSCs from AFI 10-201 Table 3.1. RULE 19</i> )	
DOD CIVILIANS INCLUDED					
(U) ADDITIONAL NOTES:					
REPORT PERSONNEL P-LEVEL IAW AFI 10-201 AND AETC SUP 1, <b>Chapter 3</b> , <b>Chapter 2</b> para 2.15.3, AND PERSONNEL CHECKLISTS. LIST CRITICAL AFSC'S BY SKILL LEVEL ON CRITICAL PERSONNEL CHECKLIST(S) BY AFSC, AUTH, ASGN, AVAIL. DO NOT COUNT OVERAGES IN ASGN OR AVAIL CALCULATIONS.					
AF FORM 723, OCT 98 ( <i>EF-V1</i> )		UNCLASSIFIED            (When filled in)		DERIVED FROM:	
		SECURITY CLASSIFICATION		DECLASSIFIED ON:	
				_____	

**UNCLASSIFIED** (When filled in)

**SECURITY CLASSIFICATION**

**III. (U) MEASURED RESOURCE AREA (Continued)**

**B. (U) EQUIPMENT AND SUPPLIES O/H**

**COMBAT ESSENTIAL**

AIRCRAFT POSSESSED (EQSEE)

**SUPPORT EQUIPMENT AND SUPPLIES**

MOBILITY BAGS (RICDA REMARK ONLY)

MRSP (ESSA1 AND REMARKS)

ECM PODS (ESSA4)

MOBILITY EQUIP (ESSA5)

SPARE ENGINES (ESSA2 REMARK ONLY)

(U) ADDITIONAL NOTES:

AUTHORIZED 30 DAY DEPENDENT MRSP (18 PMAI).

SEE SECTION IV, AMPLYFYING NOTES

**C. (U) EQUIPMENT CONDITION**

**COMBAT ESSENTIAL**

**SUPPORT EQUIPMENT AND SUPPLIES**

AIRCRAFT MRA

NOT MEASURED

(U) ADDITIONAL NOTES:

AIRCRAFT WILL BE CONSIDERED MISSION READY AND AVAILABLE IAW ACC SUPPLEMENT TO AFI 21-103.

**AF FORM 723, OCT 98 (EF-VI)**  
(PerFORM PRO)

**UNCLASSIFIED** (When filled in)

**SECURITY  
CLASSIFICATION**

**THIS IS ONLY AN EXAMPLE**

**UNCLASSIFIED** (When filled in)

**SECURITY CLASSIFICATION**

**III. (U) MEASURED RESOURCE AREA** *(Continued)*

**D. (U) TRAINING**

METHOD B : q CREW  
TRAINING

METHOD C: OPTION 1 q UNIT TRAINING q OPTION 2 X  
COMBAT AIR FORCES

AVIATION TRAINING

(U) ADDITIONAL NOTES:

C-LEVELS WILL BE DETERMINED IAW AFI 10-201, [Table 6.3](#), METHOD C, OPTION 2. MISSIONS LISTED IN SECTION II ARE THE BASIS FOR THE TRAINING MEASURED AREA C-LEVEL. TO MEET MISSION REQUIREMENTS, SOME PILOTS REQUIRE ADDITIONAL QUALIFICATIONS/ TRAINING TO BE COUNTED MRA.

(In this sample, the unit is tasked to report training of Combat Air Forces and Support Units.)

**IV. (U) AMPLIFYING NOTES** *(As required)*:

A. (U) MISSION CAPABILITIES LISTED IN SECTION II ARE MEASURED IN THE OVERALL C-LEVEL. ADDITIONALLY, SPECIAL CAPABILITIES, WHICH REQUIRE LESS THAN ALL AIRCREWS TO BE TRAINED, WILL BE REPORTED IAW AFI 10-201.

B. (U) UTCS WILL BE TAILORED UNTIL SEPARATE 18 PMAI BK 50 DEP GP UTCS ARE DEVELOPED FOR THE 55 FS.

C. (U) NO ADDITIONAL EQUIPMENT IS AUTHORIZED FOR HTS TRAINING. SQUADRON WILL UTILIZE EXISTING ASSETS TO TRAIN PILOTS IN THE USE OF HTS.

\*\*\* (CONTINUED SECTION III B.) \*\*\*

USE WSMIS DERIVED PERCENTAGES FOR SPARE ASSESSMENT (SORTIE GENERATION, DRIVER CODE Y UNDER LABEL ARUSD) UNLESS WSMIS IS NOT AVAILABLE, OR INACCURATE, THEN USE ASM (ALSO DRIVER CODE Y). IF ASM IS NOT AVAILABLE, USE FILL RATES (DRIVER CODE X UNDER THE LABEL ARUSD). IF WSMIS IS AVAILABLE AND ACCURATE BUT ASSESSES LESS THAN C-1, REPORT WSMIS RATE IN LABEL ARUSD THEN USE ASM AS A COMMANDER'S ASSESSMENT TOOL TO SUBJECTIVELY ASSESS THE UNIT'S OVERALL C-LEVEL (IF APPROPRIATE) AND THEN REPORT THE ASM SORTIE PERCENTAGE AND ASM PROBLEM PARTS IN THE ESSA1 REMARK.

AF FORM 723, OCT 98 (EF-VI)  
(PerFORM PRO)

**UNCLASSIFIED**

(When filled in)

**SECURITY  
CLASSIFICATION**

**THIS IS ONLY AN EXAMPLE**

**UNCLASSIFIED** (When filled in)

**SECURITY CLASSIFICATION**

<b>V. GAINING COMMAND(s)</b>					
A. (List commands in order)		B.		C.	
D.		E.		F.	
<b>VI. COORDINATION/REVIEW</b>					
MAJCOM COORDINATION	AOCR	XPJ	XPM	LGQ	LGF
MAJCOM COORDINATION	DOTO	DON	DO		
MAJCOM COORDINATION					
MAJCOM COORDINATION					
MAJCOM COORDINATION					
MAJCOM APPROVAL				MAJCOM APPROVAL DATE	
UNIT CC REVIEW					
MAJCOM ANNUAL REVIEW					
MAJCOM ANNUAL REVIEW					
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## **Vita**

Captain Andrew Nation commissioned in the U.S. Air Force in 2007 as a Distinguished Graduate of the United States Air Force Academy with a Bachelor of Science degree in Systems Engineering. He went on to graduate from Specialized Undergraduate Navigator Training with Distinguished Graduate honors before his initial assignment to the 349th Air Refueling Squadron at McConnell Air Force Base, KS. In 2010, Captain Nation served as a Readiness Officer before transitioning to a job as Chief Executive Officer from 2011 until 2013. He then moved to the 22d Operations Support Squadron in 2013, where he served as the Operations Group Director of Aircrew Programs, responsible for readiness reports, aircrew manning allocation, and instructor upgrade programs for over 400 aviators. In 2014, Captain Nation was the Executive Officer to the Commander, 22d Operations Group, before taking over his current position as Flight Commander of Aircrew Flight Equipment for the 22d Operations Support Squadron. While stationed at McConnell Air Force Base, he enrolled in the Air Force Institute of Technology's Graduate School of Engineering and Management in October 2011 to pursue a Master of Science Degree in Systems Engineering via the Distance Learning program. Captain Nation is a KC-135 Evaluator Navigator with over 1,400 flight hours and over 900 combat hours flown through five deployments in support of Operations IRAQI FREEDOM, ENDURING FREEDOM, NEW DAWN, and INHERENT RESOLVE.

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14. ABSTRACT In the late 1990s, the Air Force eliminated over 200 KC-135 navigators, leaving 50 remaining for the aircraft's most complex Special Operations Air Refueling (SOAR) mission. As the Air Force unveils the KC-46 Pegasus, this mission will continue but without a position for the navigator. Instead, navigators will undergo divestment as the SOAR mission transfers to the KC-46. Current plans indicate navigators will not only remain as the KC-46 arrives, but inbound navigators will continue arriving until 2018. This thesis applies the Delphi method, a process eliciting analysis anonymously from a panel of experts, in order to examine the elements affecting KC-135 navigator divestment and offer a more effective, comprehensive solution. Ultimately, the panel of experts arrived at conclusions supporting the hypothesis that navigator divestment and SOAR transition should occur sooner, rather than later, in order to secure a future for current navigators, ensure responsible development of Air Force officers, and enable the complex SOAR mission to endure. In order to best achieve these results, the experts recommended halting all inbound navigator assignments, reassigning navigators at a conservative rate over the next several years, and beginning a SOAR transition program to replace the tanker navigator with a third pilot concept.					
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